STUDIES IN NAJADES.

BY DR. A. E. ORTMANN.

The following studies intend to continue my "Notes upon the families and genera of the Najades," published in the Annals of the Carnegie Museum, vol. 8, 1912, pp. 222–365. They contain additional observations on the anatomy and systematic position of forms which have come to hand since that paper was published.

MARGARITANA SINUATA (Lamarck). (See Ortmann, l. c. p. 232).

I have received from W. Israël the soft parts of two specimens from the eastern Pyrenees, near Perpignan, France.

The gill-structure of this species is entirely like that of *M. margaritifera*, that is to say, the interlaminar connections are irregularly scattered and do not form septa and water tubes, and near the base of the gills there is a slight tendency to stand in oblique rows. The inner edge of the anal opening is almost smooth, with very slight and indistinct crenulations, and does not differ from that of *M. margaritifera*. The connection of the posterior margins of the palpi extends, in the two specimens before me, for a little less than one-half of the margins, while in *M. margaritifera* they are connected for from one-half to two-thirds, but this clearly depends upon the state of the contraction.

MARGARITANA MARGARITIFERA (Linnæus). (See: Ortmann, l. c. p. 220.)

W. Israël sent me 10 gravid females of this species, collected August 6, 1912, in the Goernitzbach, Oelsnitz, Saxony.

These specimens show that there is no difference whatever in the shell of the two sexes, and chief of all, that the so-called "arcuate" shape of the shell is not connected with sex.

The structure of the gills, chiefly the arrangement of the interlaminar connections, is somewhat variable: the tendency of these connections to form oblique rows is variously developed, and, as far as I can see from the present material, is most strongly pronounced in the female. However, I could not venture to warrant that it is possible to distinguish the sexes by this feature.

In the gravid females, all four gills are charged: sometimes practically the whole of the gills is filled with embryos; in other cases a

larger or smaller part at the anterior end of the gills is not charged, but this may be due to the fact that the contents have been partly discharged. The charged gills are very little swollen, and the embryos fill the interstices between the interlaminar connections without forming placentæ; yet a slight mutual cohesion of the embryo is present.

The glochidia are very small. Length, 0.06 mm.; height, 0.07 mm. Their shape is subovato-circular, slightly higher than long. The lower margin is more narrowly rounded, so that a blunt and indistinct point is indicated. Of the published figures, that of Harms (Zool. Anzeig. 31, 1907, p. 817, fig. 5) comes nearest to the actual shape, but is too regularly round. The other figures of Harms (ibid., fig. 4, and Zool. Jahrb. Anat. 28, 1909, pl. 13, figs. 1 and 2) are poor, since they represented oblique views of the glochidium. The figure of Schierholz (Denkschr. Ak. Wiss. Wien. 55, 1889, pl. 4, fig. 65) does not at all represent this species.

Harms gives 0.0475 mm. as the size, which, according to my measurements, is too small. He also describes and figures small teeth or spines in the middle of the lower margin; I cannot see these. In their place there is a narrow flange, which projects toward the inside of the shell, and in a lateral (edgewise) view, this appears sometimes as a short spine.

Margaritana margaritifera falcata (Gould). (According to Simpson, Pr. U. S. Mus., 22, 1900, p. 677, synonym to *M. margaritifera*).

Two specimens from Chehalis River, Porter, Chehalis Co., Washington, collected by H. Hannibal, July, 1912.

This western form of *M. margaritifera*, whether we regard it as distinct or not, has exactly the structure of the soft parts of the normal form. In one of the two specimens before me, the arrangement of the interlaminar connections in oblique rows is much more distinct than in the other; the former might possibly be a female.

Fusconaja subrotunda leucogona nov. var.

This form is the representative of *F. subrotunda* (Lea) in Elk River in West Virginia (Kanawha drainage). I collected it on May 25, 1911, at Sutton, Braxton Co.; on July 8, 1911, at Gassaway, Braxton Co., and July 10, 1911, at Shelton, Clay Co. I also saw

dead shells on July 9 at Clay, Clay Co. The type-set is from Gassaway, Carn. Mus., no. 615399.

This form may be described as a rather small and somewhat flattened *subrotunda*. It corresponds to a degree to the var. *kirtlandiana* (Lea) of the upper Tuscarawas, Beaver and French Creek drainages in Ohio and Pennsylvania, but it is not quite so flat as the latter, is smaller, and has not the subulate shape of the upper posterior part. In fact, in shape it does not differ much from typical *subrotunda*, and moreover, the degree of compression is quite variable.

The soft parts, however, show some very marked peculiarities in their color. While typical *subrotunda* has either orange or whitish soft parts, with the placentæ and eggs (and of course the gills of the gravid female) always of a red color, in the Elk River form the soft parts are of the white type, and placentæ and eggs are white. This, at least, is the rule. But there are rare exceptions: at Gassaway I found a single male, which had orange soft parts, and at Shelton I found a few males and females with orange soft parts, and a few females had cream-colored, pink or red placentæ; in one case only orange soft parts and red placentæ were associated. This shows clearly that the Elk River shell is to be regarded only as a local race of *subrotunda*, probably passing into the normal form in the lower part of Elk River (Shelton, where the greatest number of specimens with red or orange was found, is the lowermost point where I collected.

The anatomy of this form is absolutely identical with that of *subrotunda*. On all three dates I found gravid females, but on May 25 they all had only eggs; on the other days glochidia were present. One specimen collected July 8 had the ovisacs only partly charged, and in a number of them the basal part was empty, while the distal part contained yet parts of the placentæ. This shows that the placentæ are sometimes discharged in sections. Glochidia identical in shape and size with those of *subrotunda* and *kirtlandiana* (Ortmann, Mem. Carn. Mus., 4, 1911, pl. 89, fig. 1). Length, 0.13; height, 0.15 mm.

Fusconaja bursa-pastoris (B. H. Wright). (See *Quadrula b.-p.* Simpson, 1900, p. 791).

I collected a number in Clinch River, at Richland and Raven Tazewell Co., Va., on Sept. 20 and 21, 1912.

Structure identical with that of *F. subrotunda*. Anal opening separated from the supra-anal by a very short mantle connection, with fine but distinct crenulations. Branchial with papillæ. Posterior margins of palpi connected for about one-third to one-half of their length.

Gills short and wide, the inner wider. Inner lamina of inner gill free from abdominal sac, except at its anterior end. In the female, all four gills have marsupial structure. None of the females was gravid.

Color of soft parts generally of the orange type, with foot, adductors and mantle margin often deep orange, rarely paler. In a few specimens the soft warts were pale brown to whitish. Gonads in most females intensely red (crimson); also in the males more or less red or pink, but in the latter they were in some cases brownish-gray.

(*To be continued.*)

SPRING COLLECTING IN SOUTHWEST VIRGINIA.

BY CALVIN GOODRICH.

[*Concluded from page 82.*]

Some additions were made the next morning to Dr. Ortmann's Naiad list of the Clinch a mile and a half below St. Paul: *Micromya cælata* (Conrad), *Eurynia recta* (Lam.), and *Nephronaias ligamentina gibba* (Simpson), closely allied to *N. perdix* (Lea). *Io* at this point was seemingly all provided with tubercules. The shells were to be found on the larger stones on the up-stream side, or under an up-stream shelf, in the swifter water. An occasional one appeared in relatively quiet water. The white disintegrating shells of *Campeloma decisum* (Say), were common on the flood plain here.

Our next collecting spot was in the South Fork of the Powell river at Big Stone Gap, Wise Co., Va. The Doctor tackled the stream at once, while I climbed the big ridge, which hangs over it, in search of land material. The ridge proved to be entirely of sandstone and was as barren of molluscan life as the ordinary town lot, no bones at all being seen and only two living individuals, juvenile *Polygyræ*. Joining Dr. Ortmann after a couple of hours, I found